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ABSTRACT

Within the last 20 years, the quantity of computers in American schools has significantly increased. However, teachers have not been adequately using computers in the classroom. A similar trend is the Turkish Ministry of Education's investment in a significant amount of money to purchase computers for public schools in Turkey. In this study, the effect of an educational computing training program on Turkish teachers' attitudes toward computers and the effect of computer-integrated classes on Turkish students' motivation is investigated. The subjects of the study were 21 middle school teachers and their students. There were two independent variables: teacher training and computer-supported instruction implemented by the trained teachers. Because empirical studies about computer usage in Turkish schools could not be located, some data for American schools is presented first to indicate what might also be true for the Turkish schools. The study sought to understand how Turkish teachers respond to an instruction computing training program design based on data from research conducted in the United States, and how Turkish students respond to computer integrated lessons created by trained teachers. (Contains 20 references.) (Author/AEF)

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The Effects Of Computer Training On Turkish Teachers' Attitudes Toward Computers And The Effects Of Computer-Supported Lessons On Turkish Students' Reported Motivation To Lessons

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Abstract

Within the last 20 years, the quantity of computers in American schools has significantly increased. However, teachers have not been adequately using computers in the classroom. With a similar trend, the Turkish Ministry of Education has invested significant amount of money to purchase computers for public schools in Turkey. In this study, the effect of an educational computing training program on Turkish teachers' attitudes toward computers and the effect of computer-integrated classes on Turkish students' motivation will be investigated.

The subjects of this study are 21 middle school teachers and their school students in Turkey. There are two independent variables. The first independent variable is teacher training. The second one is computer-supported instruction implemented by the trained teachers.

Introduction

This study will investigate the use of computers in Turkish schools through teachers' attitudes toward computers and students' motivation to utilize computer-integrated lessons. However, since empirical studies about computer usage in Turkish schools could not be located, some data for American schools will be presented first to indicate what might also be true for Turkish schools.

Within the last 20 years, the number of computers in American schools has significantly increased. While there were 46,000 school computers in 1980 (Adams, 1985), the Office of Technology and Assessment (1995) reported that this number had increased to 400,000 by the end of the 1980s. As of 1994, schools nationwide owned an estimated 5.5 million computers (Mehlinger, 1996). Even though the number of school computers increased sharply, the percentage of computer use by teachers for instructional has remained low. The Office of Technology Assessment (1995) reported that, "a substantial number of teachers indicated little or no use of computers for instruction." Based on a national survey, Becker (1991) reported that only 17% of secondary mathematics, science, and English teachers utilized computers in the classroom "throughout the year" or "intensively, but only for certain units."

Another issue in educational computing is that computers have not been employed in an appropriate manner in the classroom. There are large qualitative gaps among teachers in using computers for instruction. Sheingold and Hadley (1990) conducted a research study on who were exemplary computer using teachers and noted what made them the exemplary. It was found that exemplary teachers utilized the computer as a multipurpose tool. On average, 95% of the exemplary teachers used the computer as a word processing tool, 89% as an instructional tool, 87% as an analytic and information tool, 84% as a programming tool, and 81% as a game/simulation tool. On the other hand, a 1989 national survey on how computers are usually used in American schools revealed that only 1% of computer-using math teachers applied spreadsheets more than five times during a year, while just 11% of computer-using English teachers said they used spell checkers regularly (Becker, 1991, 1994). This was a sharp distinction when compared to 56% and 61%, respectively, between exemplary computer using teachers and typical computer using teachers (Sheingold and Hadley, 1990).

Possible reasons for these discrepancies may be that teachers do not have the knowledge and skills about how to adapt computers to the curriculum or they have not received adequate teacher training on educational computing. The American Association of Colleges for Teacher Education (1987) conducted a survey among new teachers. This survey revealed that only 20% of the teachers entering the profession perceived themselves as prepared to teach with computers. In another study, Wiley (1992) selected 231 teachers to survey who would participate in a technology staff development program. He found that though these teachers had positive attitudes toward computers, they had insufficient knowledge about computers and strategies to effectively integrate computers into the curriculum. Okinaka (1992) concluded that lack of knowledge or understanding on how computers can be effectively used in the classroom is the most significant factor slowing the computer adoption process by teachers.

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The purpose of this study is to understand how Turkish teachers respond to an instructional computing training program design based on data from research conducted in the United States, and how Turkish students respond to computer integrated lessons created by trained teachers. More specifically, this study is to investigate whether computer trained Turkish teachers improve their attitudes toward utilizing computers in regular course instruction. In addition, this study will investigate whether Turkish students' motivation toward lessons, i.e. mathematics, science, and Turkish, could be improved through computer-integrated classes designed and implemented by trained teachers.

Literature Review

Kay (1993) constructed and applied a 7-point Likert-type computer attitude measure based on four constructs. These constructs were affective attitude, cognitive attitude, behavior, and perceived control over computers. She found that there were significant relationships between affective attitude toward computers and computer behaviors, as well as cognitive attitude toward computers and computer behaviors. In another study, Pencer et al. (1992) surveyed 230 psychology undergraduate students to predict computer-related behavior based on computer-related attitude. Regression analysis shown that 17 computer-related behaviors could be predicted from the subjects' underlying attitudes.

For validating a scale to assess changes in teachers' attitudes toward computers, Kluever et al. (1994) surveyed 265 teachers participating in a training program. Significant difference was found between the students' attitude toward computers pretest scores before the training and posttest scores after the training. Yildirim (2000) investigated "the changes in attitudes of pre-service and in-service teachers due to participation in an educational computing class and the factors that contributed to the teachers' use of computers." It was found that after the class teachers' computer anxiety was significantly decreased and their computer liking and computer confidence were significantly increased.

Investigating the relationship among computer achievement, attitude toward computers, and environmental variables - such as computer access, computer help, and computer requirements - Liu & Johnson (1998) conducted research involving 138 female and 70 male teacher education students enrolled in a required basic computer technology course. The regression analysis showed that there was a significant motivational impact on students' learning performance.

A study was conducted by Perez and White (1985) to "explore motivational and educational differences between microcomputer activities and classical classroom activities." In the study, it was concluded that "a computer learning environment introduces and increases usage of varied motivational and educational factors which have the potential to improve learning as well as academic interests" (p.42).

Seymour and Sullivan (1984) surveyed 139 fifth and sixth grade students in six classrooms to investigate the relationship among continuing motivation of instructional medium, task difficulty, and sex of subjects. The two media that were used as instructional interventions were computer and paper/pencil with two difficulty levels: hard and easy. Continuing motivation was defined as "students' choice of instructional medium for a second learning task after they had completed an initial task either on a microcomputer or paper/pencil form." Factorial ANOVA analysis detected that there was a significant motivational difference between the two groups in terms of preferring one of the two learning mediums for a possible second learning task.

Method

Participants

The participants of this study are middle school teachers and their students of a private school in Turkey that offers kindergarten through eighth grade. The number of middle school teachers participating in this study is 21 (ten females and eleven males). Their distribution according to the subjects they teach and gender is as follow: four mathematics (two females and two males), two science (two males), four Turkish (two females and two males), three social science (one female and two males), and eight English (five females and three males). Their teaching experience ranges from two to ten years with an average of 4.5 years.

Independent Variables

Since there are two interventions in this study, there are two independent variables. The first independent variable is teacher training. The second is computer-supported instruction implemented by the trained teachers in the actual classroom environment.

The first independent variable, teacher training, had two levels: (a) no teacher training and (b) teacher training. The training was designed to teach in-service Turkish teachers educational computing competencies rated as important or very important by their American counterparts. During the training, Turkish teachers were provided with exposure to, knowledge about, and experience with educational computing.

Initially, teacher computer competencies were identified. The first set of competencies was identified by Scheffler (1995), who found 127 teacher computer competencies through literature review and interview with computer representatives. Using the Delphi technique and survey method, Scheffler (1995) reduced 127 competencies to 67.

In another study used to discover teacher computer competencies, Berg et al. (1998) utilized two evaluation phases to identify exemplary technology uses by teachers and students in elementary classrooms in southwestern Ohio. 39 distinct exemplary classroom applications of computers were found, 11 of which were specifically for teachers.

The specific computer competencies taught in the training were derived from those two lists. From the first list, the items that were rated 4 or 5 (important and very important) and related directly to teaching and learning activities performed by classroom teachers were selected. The ones that were not directly related to computer skills teachers may require, not directly related to teaching and learning in the classroom, and the ones that were similar in nature were eliminated. Some eliminated competencies were "demonstrate to students and other classroom teachers the computer as a beneficial tool that increases efficiency and productivity," "demonstrate skills in using a computer keyboard," "demonstrate appropriate use of computer technology for basic skill instruction," "use modem for communication between computers," "define elements of a local educational agency technology plan," and "plan methods to integrate computer awareness and literacy into the existing curriculum." This elimination resulted in 26 usable competencies.

From the second list created by Berg et al. (1998), the competencies specific for teachers and rated 5 or 6 (moderately important and highly important) were selected. This selection resulted in 5 competencies. The total competencies grew to 31

The second independent variable, teachers' implementation of a computer-supported class in an actual classroom, environment, has two levels: (a) implementing a computer-supported class in the classroom and (b) implementing a non-computer-supported (classical) class in the classroom. After the training, teachers will be required to design and implement a sample course in an actual classroom setting using the skills, knowledge, and competencies acquired through the training. This second intervention will be used to measure to what extent teachers who had the educational computer training will increase their students' motivation towards lessons.

Dependent Measures

There will be two dependent measures:

1. Teachers' attitude towards computers as measured by the Computer Attitude Scale.
2. Students' motivation towards courses by the Course Interest Survey.

Attitude is defined as "an evaluative disposition based upon cognition, effective reactions, behavior intentions, and past behaviors which can influence future cognitions, effective responses, intentions, and behaviors" (Dusic, 1998). In this study, the Computer Attitude Scale (CAS) (Loyd & Loyd, 1985) will be employed to measure teachers' attitudinal change towards computers after the intervention.

The CAS has 40 Likert-type items presenting statements of attitudes towards computers and the use of computers. The items are divided into four categories each of which represents one subscale of the CAS: (a) anxiety or fear of computers that represents the Computer Anxiety (CA) subscale, (b) confidence in ability to use or learn about computers that represents the Computer Confidence (CC) subscale, (c) liking computers or enjoying working with computers which is the Computer Liking (CL) subscale, and (d) perceived usefulness of computers in present or future work representing the Computer Usefulness (CU) subscale. Each subscale has ten items and respondents rate items by indicating to what extent they agree or disagree with the expressions in each item (from strongly disagree to strongly agree with four choices)

The estimated total alpha reliability coefficient of the CAS is 0.95 with the following coefficients for the subscales: 0.90 for Computer Anxiety, 0.89 for Computer Confidence, 0.89 for Computer Liking, and 0.82 for Computer Usefulness. The CAS is a reliable and valid instrument to assess teacher attitudes toward computers (Loyd & Loyd, 1985).

Driscoll (1993) defined learning motivation for a student as "deciding to engage in a learning task and persisting in that task." In this study, Keller's (1995) Course Interest Survey (CIS) was used to measure students' motivation toward computer-supported and non-computer-supported lessons. The CIS measured students' motivation to learn in a particular course. It had 34 items divided into four categories: (A) attention, (R) relevance, (C) confidence, and (S) satisfaction. The items in the attention category measure whether the interest of learners was captured and their curiosity to learn stimulated by the lesson. The relevance items inquire as to whether the personal needs/goals of the learner were met to affect a positive attitude. Items related to confidence evaluate the perception of learners about whether they will be able to succeed and control their success. Finally, the satisfaction items measure whether students' accomplishments in the classroom were reinforced.

Cronbach's alpha coefficient for the total survey was found to be 0.95. The subscales' coefficient values were: 0.84 for attention, 0.84 for relevance, 0.81 for confidence, and 0.88 for satisfaction. Additionally, it was found that there were significant correlations between the CIS results and course grades (Keller, 1995). They show that CIS was a reliable and valid tool to measure students' motivation in a specific classroom situation.

Both instruments, the CAS and CIS, were originally written in English and the English versions were validated. Because the teachers' and students' native language in this study is Turkish, the researcher will translate the English versions of the surveys into Turkish. The translated surveys will be checked and corrected by two language experts. The language experts are studying Turkish linguistics and literature in the United States, and are fluent in both American English and Turkish. No data is available about the reliability of the Turkish versions of the surveys. They will be calculated after the surveys are administered.

Procedure

Using a stratified random sampling method, I assigned 21 middle school teachers to either a control group or an experimental group. First, all 21 teachers were stratified according to their subject matters: mathematics (four), science (two), social science (four), Turkish (three), and English (eight). Second, half of the teachers within each stratified group were randomly assigned to either a training group or a control group. However, some teachers who were randomly assigned to the training group indicated that they would not be available for the training. They were then replaced with teachers in the control group. This assignment resulted in 11 teachers in the training group and 10 teachers in the control group. All 21 teachers will complete the Teacher Consent Form and the CAS before training is administered.

The training will take place at the school site. It will be given by the researcher in Turkish and take approximately 30 hours. The training will be given in a classroom lecture format to provide teachers with verbal information on how computers can be integrated into curriculum. Besides the lectures, computer lab sessions will be arranged to provide teachers with hands-on computer skills and competencies. From the instructional flow diagram, it is predicted that the lab section will take approximately 15 hours and the class section 20 hours.

After completing the training, teachers will design a sample computer-supported class based on the knowledge and skills they gained through training and implement that sample class in an actual classroom setting. Before implementation, each teacher will have students complete the Student Consent Form and the CIS. After the implementation of the computer-integrated class, students will again complete the CIS. Meanwhile, when teachers in the control group teach the same topics in the same lessons, such as mathematics, science, and Turkish without computer support, they will have their students complete the Consent form as well as the CIS. Finally, all 21 teachers will fill out the CAS.

Because the same students and the same teachers will answer the pretest as well as the posttest, pretest sensitization is an issue. Pretest sensitization refers to "improved score on a posttest resulting from subjects having taken a pretest. In other words, taking a pretest may improve performance on a posttest, regardless of whether there is any treatment or instruction in between" (Gay, 1996). To avoid the pretest sensitization, the pretest will be administered at the beginning of the study. This will make approximately 50-day gap between pretest and posttest. This time gap may minimize the pretest sensitization (Gay, 1996).

Hypotheses

Derived from the four research questions in the Introduction section, two hypotheses are provided. Each hypothesis was based on the information in the literature review section.

Hypothesis 1: Effect on Teacher Attitude Towards Computers

That the trained teachers will change their attitude towards computers, which will be detected by the CAS employed after the training. More specifically, that the teachers who receive the educational computer training, which aims to teach the computer competencies rated as important or very important by American computer using teachers, will record higher scores on the attitude questionnaire than those teachers in the control group who receive no training.

Hypothesis 2: General Effect on Students' Motivation

Students who receive the computer-supported classes will exhibit higher motivation detectable by the CIS form. In addition, students who have computer-supported classes, designed and implemented by the teachers who received the educational computer training, will exhibit higher motivation towards the lessons than those students who receive the same versions of the classes with no computer support.

Research Design and Data Analysis

For each hypothesis, a different research design and data analysis technique will be employed to minimize the statistical errors.

Hypothesis 1: For the first hypothesis, the research design technique will be a pretest/posttest control group design. Because the study deals with differences in teachers' computer attitudinal scores, a control group will be used to better understand whether the motivational difference between the control and experimental groups is due to the treatment, and not due to other factors. In this type of design, there are two groups of subjects, both of which are given a pretest of the dependent variable. Then, one group receives treatment and the other group does not. Finally, both groups take the posttest. The effectiveness of the treatment is determined by comparing the posttest scores (Gay, 1996).

In this study, there are only 21 teacher subjects. This limited number of subjects may bring some questions about validity and reliability of research due to the violation of some assumptions in parametric tests. For the data analysis of the first design, the Wilcoxon-Mann-Whitney test will be employed to measure the significance of the training. The Wilcoxon-Mann-Whitney test is a powerful non-parametric test that is useful alternative to a t-test procedure when a researcher wants to avoid the negative effects of assumptions in parametric statistics, such as the normal distribution assumption and equal variance assumption (Siegel & Castellan, 1988).

Hypothesis 2: Similar to the previous method, the pretest/posttest control group experimental design procedure will be employed for the second hypothesis. Because analysis of pretest/posttest gained scores has several disadvantages, pretest differences can be better controlled by covariance (Gay, 1996). Thus, ANCOVA (analysis of covariance) will be employed for data analysis in this study, and pretest scores will be used as a covariate.

Because no study was found where the CAS and CIS were administered to the control group and the experimental group at the same time, no previous data is available about the mean scores and variances of both groups, and statistical power cannot be estimated without this information (Feldt, 1993). After collecting data and calculating descriptive statistical values, the statistical power will be calculated.

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